

Space Nutrition



Volume 1

What's New in Bone Research

Issue #2

Bone Food Facts

Calcium is probably the most important nutrient for building strong bones. You should eat at

least 4 servings of dairy products each day to make sure that you get enough calcium. One serving is equal to 1 cup of milk or yogurt, or



2 ounces (2 slices) of cheese. Other good sources of calcium are green, leafy vegetables like spinach. Getting enough calcium from the food you eat is much easier than you think.



Space Facts

NASA has 4 shuttles -Columbia, Discovery, Atlantis, and Endeavour. Each shuttle flight has an STS or Space Transportation System number. E381 (our calcium experiment) will fly on STS-107.



NASA's Nutritional Biochemistry Laboratory has been studying calcium and bone changes during space flight for several years. Our most recent experiments were completed on the Russian Space Station Mir, from 1995 through 1997. We studied the effects of weightlessness on bone during long-duration missions-those lasting more than 30 days. We are currently preparing a similar experiment for a shuttle mission to determine the changes in bone and calcium early after exposure to weightlessness. This experiment will fly on the space shuttle Columbia, currently scheduled to launch in June 2002.

Our experiment is called "Calcium Kinetics During Space Flight." This study is also known as Experiment # 381, or E381, and is designed to determine how living and working in microgravity changes the movement of calcium in the body. We will also study how human bones change during space flight. Since the bone loss that occurs during space flight is similar to that seen in some Earth diseases, the results of our studies may help other scientists develop treatments for osteoporosis and other conditions in which bone is lost.

Science Facts

To understand what happens to bone and calcium during space flight, we will collect and study biological samples before, during, and after the mission. We will collect blood, urine, saliva, and yes, even feces. NASA scientists will measure minerals, chemical messengers, and hormones in these samples.

Did you know?

- Mineralization is the deposition of minerals in bone.
- The main mineral component of bone is called hydroxyapatite. It is made up mostly of calcium and phosphorus.
- Calcium and phosphorus get to our bones from the bloodstream, and they get into the bloodstream from the food we eat.
- Calcium is important for other tissues, like muscle.
- If there is not enough calcium in the diet, calcium is released from bones to help other tissues.
- Bone (and calcium) losses during space flight increase the risk for astronauts to have fractures, kidney stones, and other health problems.



Word of the Month

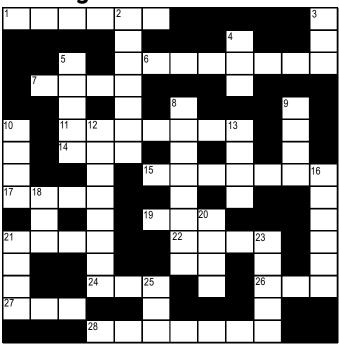
Microgravity

Can you guess what this word means? Look for the meaning of the "word of the month" in the next issue of Space Nutrition



FUN CORNER

"Building Better Bones" Crossword



Across

- 1 Cheddar a good calcium source
- 6 Without this, objects will float
- **7** Salivo
- 11 An important nutrient for strong bones
- 14 End-to- end
- **15** The Food Guide Pyramid can help you choose a _____ diet
- 17 US Space Agency
- 19 Laboratory
- 21 Meat vs. dairy which is not a good calcium source?
- 22 Astronauts lose bone during ___ missions
- **24** Space Transportation System
- **26** Teens need to ___ at least 1300 mg of calcium
- 27 The Earth's closest star
- **28** Eating the right amount of ____ is essential for strong bones

Down

- 2 E381 will fly on the ____ Columbia
 - 4 servings of dairy foods are recommended each ____
- 4 Acronym for extravehicular activity
- "____, the final frontier"
- 8 Calcium and phosphorus are ____
- Dairy products are calcium- ____ food
- **10** Getting enough calcium during the ____ years is especially important for healthy bones
- **12** Space shuttle name
- 13 "____, it does a body good"
- 16 Fermented dairy product
- **18** People lose bone mineral as they ___
- **20** Back____, a.k.a the spine
- 21 The Red Planet
- 22 Supplemental Medical Objective
- 23 ____ leafy vegetables , a good calcium source

Look for the solution in the next issue of Space Nutrition



For more information, log on to the Nutritional Biochemistry Laboratory's website at

www.jsc.nasa.gov/sa/sd/facility/nutrition.htm